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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/756,553	01/13/2004	James G. Shepard	PD-02W173	2675
7590	02/16/2006			
John E. Gunther Raytheon Company P.O. Box 902 (E1/E150) El Segundo, CA 90245-0902			EXAMINER BOWERS, NATHAN ANDREW	
			ART UNIT	PAPER NUMBER
			1744	
DATE MAILED: 02/16/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/756,553	<b>Applicant(s)</b> SHEPARD ET AL.	
	<b>Examiner</b> Nathan A. Bowers	<b>Art Unit</b> 1744	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 January 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The claim recites a system controller to "correlate first and second detected fluorescence levels," however a "detector" is not disclosed. It is unclear how the claimed "laser diodes" interact with the "system controller" without the recitation of a "detector" as a structural limitation.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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1) Claims 5-8 are rejected under 35 U.S.C. 102(e) as being anticipated by Dai (US 20030230728).

With respect to claims 5-7, Dai discloses a bioagent detecting system comprising a first array (Figure 3:104a) of light emitting diodes (LED) for generating a first ultraviolet wavelength, and a second array (Figure 13:104b) of LEDs for generating a second ultraviolet wavelength. Dai teaches that UV light from the diode arrays is radiated upon a biological material, which in turn fluoresces. This is disclosed in paragraphs [0008]-[0015] and [0032]. LEDs and laser diodes are known in the art to be functionally equivalent devices. Paragraph [0039] teaches that a detector (Figure 3:316) is provided for determining the fluorescence level of the biomolecule. Paragraphs [0032]-[0037] indicate that the individual diodes on each array may be configured to emit light at different UV wavelengths, or may be divided into separate groups that each generate light at more than one UV wavelength. Although Dai teaches that the invention is intended to detect biomolecules labeled with a fluorescent dye, the invention is inherently capable of detecting the presence of aromatic proteins since many biological molecules naturally exhibit auto-fluorescence when induced by UV light (paragraph [0050]).

With respect to claim 8, Dai discloses the apparatus in claim 5, wherein the more than one ultraviolet wavelengths are between 270 and 340 nm. Table 1 discloses an example in which the diodes produce UV light of 250-340 nm in wavelength.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2) Claims 1, 3-15, 19, 20 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silcott (US 20030098422) in view of Dai (US 20030230728).

With respect to claims 1, 3, 5-7, 15 and 24, Silcott discloses a bioagent detecting system and method comprising the use of a laser diode (Figure 3:106) for generating ultraviolet light to fluoresce an aromatic protein. This is disclosed in paragraphs [0044]-[0051]. Furthermore, a detector (Figure 4:412) and a system controller (Figure 16:1604) are provided for sensing induced fluorescence from the protein and correlating the detected fluorescence levels with atmospheric absorption levels to determine if an ambient threshold is exceeded by a predetermined amount. This is disclosed in paragraphs [0085]-[0095]. Silcott, however, does not expressly state that multiple diodes are provided in the form of a first array for generating UV light characterized by a first wavelength and a second array for generating UV light characterized by a second wavelength.

Dai discloses a bioagent detecting system and method comprising a first array (Figure 3:104a) of light emitting diodes (LED) for generating a first ultraviolet wavelength and a second array (Figure 13:104b) of LEDs for generating a second ultraviolet wavelength. This is disclosed in paragraphs [0008]-[0015] and [0032].

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Paragraphs [0032]-[0037] indicate that the individual diodes on each array may be configured to emit light at different UV wavelengths, or may be divided into separate groups that each generate light at more than one UV wavelength. The diode arrays disclosed by Dai are intrinsically capable of generating a pair of discrete UV wavelengths in such a way that each array generates light at a separate and single wavelength. A third array (Figure 3:104c) intrinsically may be used to generate light at a plurality of different wavelengths. The diodes in a single array could also be independently controlled to produce wavelength pairs during a first time period and a plurality of many wavelengths during a second time period. Dai states in paragraph [0037] that the light source arrays are selectively operated to vary the range of wavelengths produced by the included diodes.

Silcott and Dai are analogous art because they are from the same field of endeavor regarding the use of induced fluorescence to detect a bioagent.

At the time of the invention, it would have been obvious to substitute the single laser diode disclosed by Silcott with a plurality of laser diodes arranged across multiple arrays. This would allow one the ability to simultaneously and sequentially irradiate a biological sample with UV light at a plurality of different wavelength. In paragraph [0020], Dai states that this is advantageous because it allows one to easily detect fluorescence at a variety of excitation wavelengths in a quick and efficient manner. By incorporating a plurality of individually controlled laser diodes, Silcott's device would be capable of simultaneously analyzing a sample for the presence of a plurality of hazardous bioagents that fluoresce at different wavelengths.

With respect to claims 4, 8, 10-12, Silcott and Dai disclose the apparatus set forth in claims 1 and 5 as set forth in the 35 U.S.C. 103 rejection above. Furthermore, Silcott teaches in Table 2 and paragraphs [0051]-[0054] that tryptophan fluoresces at 320-350 nm, and therefore should be irradiated with UV light of 220, 280 and 288 nm. Silcott states in paragraph [0085] that anthrax is detected using the disclosed invention. Anthrax has an aromatic-protein shell comprising tryptophan, and therefore can be quantified by detecting tryptophan fluorescence. In addition, the wavelength pairs generated by the diode arrays disclosed by Dai may intrinsically be produced so that they only differ by approximately 1 to 5 nm.

With respect to claims 9, 19 and 20, Silcott and Dai disclose the apparatus set forth in claim 5 as set forth in the 35 U.S.C. 103 rejection above. In addition, Silcott states in paragraph [0071] that the detector comprises avalanche photo diodes to detect fluorescence levels. Silcott states in paragraphs [0058] and [0059] that the UV laser light is collimated by lenses. The collimator intrinsically could collimate the laser light for direction toward a suspect cloud in the atmosphere.

With respect to claims 13 and 14, Silcott and Dai disclose the apparatus set forth in claim 5 as set forth in the 35 U.S.C. 103 rejection above. In addition, Silcott teaches in paragraphs [0085]-[0095] that the system controller receives a detection signal from the detector that is proportional to the fluorescence level, and that a notification signal is

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generated when the detection signal indicates that a threshold is exceeded. The threshold is based on a predetermined value that corresponds to a standard condition.

3) Claims 2, 16-18 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silcott (US 20030098422) in view of Dai (US 20030230728) as applied to claims 1, 15 and 24, and further in view of Engelhardt (US 20010025930).

Silcott and Dai disclose the apparatus set forth in claim 1 as set forth in the 35 U.S.C. 103 rejection above. In addition, Silcott discloses in paragraph [0071] that the detector comprises avalanche photo diodes to detect fluorescence levels. Silcott states in paragraphs [0058] and [0059] that the UV laser light is collimated by lenses. Dai teaches in paragraphs [0032]-[0037] that the diode array comprises additional groups for generating other a plurality of wavelengths which cause fluorescence. Silcott and Dai, however, do not expressly disclose that the system controller is to repeat the addressing and correlating for diodes in order to determine the presence of an analyte.

Engelhardt discloses a method for the detection and analysis of a specimen in which a laser (Figure 2:7) is used to fluoresce a sample (Figure 2:5). A detector (Figure 2:11) is provided to analyze the emitted light. This is disclosed in paragraph [0053]. Paragraphs [0026] and [0027] state that a system controller (Figure 2:15) is used to control the operation of the laser in order to radiate the sample with a plurality of different wavelengths over time. The information gathered at each of the different wavelengths by the detector is used to more completely characterize the nature of the specimen.



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Silcott, Dai and Engelhardt are analogous art because they are from the same field of endeavor regarding the use of light to produce fluorescence in a biological sample.

At the time of the invention, it would have been obvious to repeatedly analyze a sample at different wavelengths over time using the apparatus and method proposed by Silcott and Dai. Engelhardt teaches that fluorescence can be detected at different wavelengths and at different times, and that the resulting information can be compared in order to more thoroughly determine the nature of the biological sample. The device proposed by Silcott and Dai is entirely capable of being used in this way, since a plurality of arrays, each comprising a plurality of diodes, are provided. Therefore, it would have been obvious to repeatedly emit UV light from the diodes and detect the subsequent fluorescence of the sample to attain more accurate and reliable results. This is especially true when using the device to determine the presence of hazardous bioagents since precise detection methods encourage safety.

4) Claims 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silcott (US 20030098422) in view of Dai (US 20030230728) as applied to claims 15 and 20, and further in view of Petrich (US 20030160182).

Silcott and Dai discloses the apparatus set forth in claims 15 and 20 as set forth in the 35 U.S.C. 103 rejections above, however do not expressly disclose that the apparatus comprises a range finder, or that the apparatus is handheld.

Petrich discloses an apparatus that comprises a plurality of light sources (Figure 4:110) that emit ultraviolet light in order to cause a hazardous bioagents upon a sample (Figure 1:140) to fluoresce. This resulting fluorescence is detected by a sensor (Figure 4:130) which relays information to a processor (Figure 4:117). This is disclosed in paragraphs [0015] and [0032]-[0038]. Petrich teaches that the device is handheld and is adapted to receive batteries. Paragraph [0039] teaches that the apparatus further includes a proximity sensor (Figure 4:122) that is capable of determining the distance to a biological sample.

Silcott, Dai and Petrich are analogous art because they are from the same field of endeavor regarding the use of fluorescence to determine the presence of undesirable biological compounds.

At the time of the invention, it would have been obvious to construct the apparatus proposed by Silcott and Dai as a handheld device. Petrich teaches in paragraphs [0003] and [0011] that handheld devices are lightweight and portable, and are useful because they can be easily transported to any place that requires the detection of a biologically dangerous compounds. This type of portable device is necessary to analyze a suspect cloud that may materialize anywhere and at any time. Furthermore, it would have been obvious to provide the invention with a range finder. Petrich teaches in paragraph [0039] that a range finder is beneficial because it can be used to restrict UV radiation if the object to be analyzed is determined to not be within the light path or not be within a certain distance from the light source. This is

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advantageous because it provides increased safety to the user by reducing any unintended and unnecessary exposure to the light source.

5) Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Silcott (US 20030098422) in view of Dai (US 20030230728) as applied to claim 5, and further in view of Reichert (US 6911344) or Giebeler (6313471).

Silcott and Dai disclose the apparatus set forth in claim 5 as set forth in the 35 U.S.C. 103 rejection above. Silcott discloses tunable fiber lasers, however do not disclose that a blaze grating is used to receive multiple wavelength light from the array of diodes and direct a selected wavelength through an output coupler.

Reichert and Giebeler disclose apparatuses for facilitating fluorescence detection of biological compounds. Reichert states in column 2, line 64 to column 3, line 41 that blaze gratings and output couplers are known in the art as effective ways to select a desired wavelength. Giebeler discloses the use of blaze gratings in column 6, lines 9-24 and in column 8, lines 29-45.

Silcott, Dai, Reichert and Giebeler are analogous art because they are from the same field of endeavor regarding fluorescent detection procedures.

At the time of the invention, it would have been obvious to add a blaze grating and an output coupler to the apparatus disclosed by Silcott and Dai. Blaze gratings and output couplers are well known in the art and are effective mechanisms to direct light of a desired wavelength to a detector. Multi-wavelength light derived from the laser

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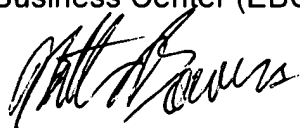
disclosed by Silcott could easily be manipulated using a blaze grating and an output coupler based on a control signal from a system controller.

### **Conclusion**


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan A. Bowers whose telephone number is (571) 272-8613. The examiner can normally be reached on Monday-Friday 8 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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